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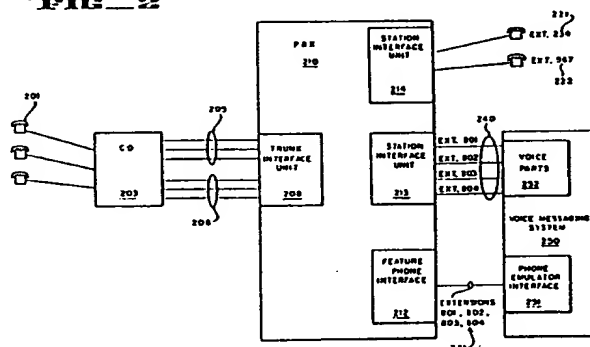
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(54) Interface to and operation of a voice messaging system.

(57) A voice messaging system for use with a telephone system. The preferred embodiment comprises a voice messaging system which interfaces to a PBX through a feature phone interface, the voice messaging system emulating a feature phone. The PBX supplies information to the voice messaging system such as information on the origination and history of the call. The present invention discloses improved methods of handling calls directed to the voice messaging system based on the information supplied by the PBX.

FIG. 2



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a caller access to the mailbox facilities. One known voice messaging system manufactured by Rolm Corporation of Santa Clara, California expedites the log in process in some instances by not requiring a mailbox user to enter his/her own extension. However, if a security code has been set on the mailbox then the user must enter security information in order to gain access to any of the mailbox facilities.

It is desired to provide access to certain facilities of a mailbox with a minimum number of steps required of the mailbox user. It is desirable to allow this special access only to certain users of the system and only during certain time-of-day and day-of-week periods.

SUMMARY OF THE PRESENT INVENTION

A improved interface to and improved method of operation of a voice messaging system interface for use with a private branch exchange (PBX) is disclosed. The voice messaging system of the present invention comprises a feature phone emulator interface which may emulate any of several known PBX-compatible feature phones with multiple line capability. The feature phone emulator interface appears to the PBX as an actual feature phone. In the present invention, the PBX is configured to assign a group of extension numbers to line appearances on this feature phone. The extension numbers correspond to single line telephone extensions which are coupled with voice ports of the voice messaging system. The voice messaging system answers all calls to these extensions by using the feature phone emulator interface.

Alternatively, the feature phone may have a unique extension number and the voice messaging system's voice ports may answer calls directed to the feature phone emulator by using the remote pickup feature of some PBXs.

Some PBX systems allow a feature phone to receive call information without answering a call through use of a special function.

The PBX provides commands to the interface which are intended to activate the phone display and provide information regarding the source of the call and, in the case of a forwarded call the reason the call was forwarded to the feature phone. The interface receives these commands and information and provides the information to the voice messaging system control software.

The voice messaging system then goes off hook to receive the call on the appropriate voice port and further processes the call. Depending on the particular PBX, it may be necessary for the feature phone emulator interface to answer the call and place the call on hold prior to the voice port going off hook. In any case, subsequent processing of the call may be performed by the voice port and the feature phone emulator interface is no longer required to take any action until the arrival of a new call.

The availability of call source and original call destination information allows the voice messaging system of the present invention to provide enhanced

functionality. For example, calls from specific sources may be assigned special classes of service which may determine how they will be processed. Specific call destinations also may be assigned specific classes of service which determine how calls into those destinations will be processed. The voice messaging system may be instructed to play specific pre-recorded greetings to incoming calls, depending on their class of service. The class of service may be determined by trunk number or trunk group number or other source information made available to the interface.

Forwarded calls which were forwarded from specific extensions or which came in from specific sources may be programmed to be given special handling. For example, the voice messaging system may be instructed to transfer calls to a designated extension after providing a voice message such as "Mr. John Doe does not answer, please hold for personal assistance". As the voice messaging system has been provided with the originally called number through the feature phone emulation interface, the voice messaging system can determine that the name "Mr. John Doe" is to be used and it can be preprogrammed with a specific extension for the call to be transferred to. For example, the call may be transferred to a personal secretary or message center. In the preferred embodiment, the voice messaging system may attempt to transfer the call to this number and will stay on the line to make sure that the transfer takes place successfully. If the personal assistance extension is busy or does not answer, the voice messaging system may then provide a voice message such as "Personal assistance is not available, please hold for the operator" and transfer the call to the PBX attendant.

Other functions and features of the present invention will become apparent from the Detailed Description of the Preferred Embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating a known telephone system.

Figure 2 is a block diagram illustrating a telephone system as may be utilized by the preferred embodiment.

Figures 3(a) through 3(f) are flowcharts illustrating a method of handling internal calls as may be utilized by the preferred embodiment.

Figures 4(a) through 4(d) are flowcharts illustrating a method of handling external calls as may be utilized by the preferred embodiment.

Figure 5 is a block diagram illustrating circuitry of a feature phone emulation circuit as may be utilized by the present invention.

Figure 6 is a block diagram illustrating use of a feature phone comprising an interface jack for coupled with a voice messaging system as may be utilized by the present invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

A telephone system, including a voice messaging system is described. In the following description, numerous specific details are set forth such as specific prompts and menus, specific codes, etc. in order to provide a thorough understanding of the present invention. It will be obvious, however, to one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well-known circuits, structures and techniques have not been shown in detail in order not to unnecessarily obscure the present invention.

The present invention discloses an improved interface to and method of operation of a voice messaging system (VMS) in which the voice messaging system is able to receive information from a telephone switching system and utilize such information to provide advanced call processing and voice messaging features.

Although the following description makes specific reference to PBX systems, the present invention anticipates the use of the disclosed voice messaging system with other telephone switching systems such as a key system, Centrex system or hybrid system. Further, the methods for processing calls described herein may be practiced in a telephone system utilizing an external voice messaging system or may be equally practiced in a telephone switching system which provides the features of a voice messaging system as an integral function of the switching system. The methods for processing calls described herein may be applied in a variety of phone systems in which the required call information may be obtained either through the methods and apparatus detailed herein or through other methods and apparatus. It will be appreciated that the methods of processing calls are not intended to be limited to use of the disclosed methods and apparatus for obtaining call information, except as specifically provided in the claims.

Known voice messaging systems allow callers to dial extensions, access online directories, leave voice messages, and dial new extensions without interfacing with a human attendant. However, such systems either are not capable of processing calls in the fashion offered by the present invention because they lack information when receiving calls such as the nature of the call, the reason the call was forwarded to the voice messaging system, etc., or in order to process calls, they must be specially configured for a specific PBX and connected to the PBX through special PBX voice messaging system ports provided by the PBX vendor as part of a PBX/voice messaging system integration feature. This type of feature is often expensive and often does not provide all the call information which may be useful to the voice messaging system.

Referring now to Figure 1, in the prior art it is known to supply a PBX 110 with a feature phone interface 112. In such a system, outside callers may place calls from any phone 101 to the PBX, such calls being routed through a central office 103 and

onto trunk lines 105 and 106 which couple the central office 103 with a trunk interface unit 108 of the PBX 110. For example, trunk group 105 may be for incoming calls from a WATS line or similar number used for allowing customers of a company to call in to place orders for products. Trunk group 106 may be for calls coming in on a general office number utilized for administrative and other functions.

In such a phone system, a call may be transferred by the console operator to a particular extension, for example extension 234, 121. The PBX may be designed to forward a call transferred to extension 234 to a message center on extensions 801 through 804, 140 if a call to extension 234 is either unanswered or if extension 234 is busy. The message center attendant may answer the forwarded call on a feature phone 130, which has line appearances 801 through 804 on its line buttons, 132.

A feature phone interface 112 provides information to the feature phone 130 which is displayed on the display 131 and by lighting line buttons 132. For example, the display may state that the call has been transferred to extension 802 because extension 234 is busy when button 802 is depressed. Thus, the call is able to be answered, with the person answering the call knowing the extension 234 was not answered because the phone was busy, and thus, the person answering may be more helpful to the caller as a result.

Referring now to Figure 2, phones 201 refer to phones of the same type as phones 101 of Figure 1, central office 203 refers to a central office of the same type as central office 103 of Figure 1, trunk groups 205 and 206 refer to trunk groups of similar types to trunk groups 105 and 106 of Figure 1, PBX 210 refers to a PBX of similar type to PBX 110 of Figure 1, and trunk interface unit 208 refers to a trunk interface unit of similar type to trunk interface unit of 108 of Figure 1.

The preferred embodiment of the present invention comprises a voice messaging system 250 which emulates a PBX-compatible feature phone with multiple line capability. To the PBX 210 the voice messaging system 250 appears to be an actual feature phone and a set of single line phones. A phone emulator interface 251 is designed to emulate the feature phone 130 of Figure 1.

Referring briefly to Figure 5, a feature phone emulator interface 251 of Figure 2 is more fully described. A data link 501 is provided for coupling the emulator interface 251 with a feature phone interface 212 on a PBX. In one embodiment of the present invention, the data link 501 comprises an RJ-11 type jack. However, it will be obvious to one of ordinary skill that many alternate data link means may be utilized and the particular data link is typically dictated by the PBX manufacturer.

The data link 501 is normally coupled with ordinary protection circuits 502 for protecting circuits in the phone system from electrical variations. Signals from the data link 501 are electrically coupled with received signal detector circuitry 504 which converts the analog data link signal to digital signals through a

two-to-four wire converter 503. Signals output from the voice messaging system are converted from digital form to analog by transmit signal generator 505. Transmit signal generator 505 is electrically coupled with data link 501 through two-to-four wire converter 503 and protection circuits 502.

The protection circuitry 502, two-to-four wire converter 503, received signal detector 504 and transmit signal detector 505 comprises circuitry similar to that found in actual feature phones. The details and specifications of the particular circuitry may vary from PBX manufacturer to PBX manufacturer.

A microcomputer 506 is coupled with the received signal detector 504 to receive digital signals from the PBX. The digital signals comprise display and other information for a feature phone which may be utilized by the voice messaging system of the present invention. The microcomputer 506 is further coupled with the transmit signal generator 505 for providing signals from the voice messaging system to the PBX. Finally, the microcomputer 506 is coupled with the voice messaging system bus 507 for providing a communication link with the remaining voice messaging system circuitry.

Referring again to Figure 2, utilizing such a phone emulator interface 251, the voice messaging system 250 is provided with information on the origin of a call and the reason the voice messaging system 250 is receiving the call when a call is transferred to the voice messaging system 250.

The PBX is programmed to assign a group of extension numbers 241 to line appearances coupled with the phone emulator interface 251. These extension numbers 241 correspond with voice port lines 240 coupled with voice ports 252 of the voice messaging system 250. The voice messaging system 250 sees calls ringing on extensions 241 by using the phone emulator interface 251. The PBX 210 provides commands to the interface which are intended to activate the phone display, such as that shown in Figure 1, 131, and provides information on the source and forwarding information of the call. The phone emulator interface 251 receives these commands and provides this information to the control software of the voice messaging system.

As previously discussed, in the preferred embodiment the phone emulator interface 251 is custom-designed to work with a particular PBX. This is necessary because the commands and information from the PBX are not supplied in a standard manner from manufacturer to manufacturer or from product line to product line. For example, depending on the particular PBX, the feature phone emulator interface 251 may either receive call information by answering the call or may receive the call information without need for answering the call through use of a special feature. In Northern Telecom's SL/1 PBX, a feature phone may accept call information by an operator depressing a "DISPLAY" button. In certain AT&T PBX's, a feature phone may accept call information by an operator depressing an "INSPECT" button. In both instances, depressing the specialized button has the effect of allowing the feature phone to receive call information without answering the call.

In any event, after the voice messaging system 250 receives the call information, the voice messaging system 250 then goes off-hook on the appropriate voice port 252 and processes the call as will be described in more detail below. Depending on the particular installation, it may be necessary for the interface 251 to place a call on hold prior to the port 252 going off-hook and taking over processing of the call. Another alternative embodiment allows one of the ports 252 to be conferenced into the call. After a port 252 is conferenced in, the voice messaging system may hang-up on port 251. In any case, subsequent processing of the call may be performed by the port and the interface 251 will not take any action on that line appearance until the port is finished processing the call, the call drops from the extension, and a new call arrives at that extension. While the port is processing the call, calls arriving on other extensions may be answered by the interface 251 and be processed in a similar manner.

As alternatives to the voice messaging system 250 going off hook on the appropriate voice port 252 and processing the call, certain installations may utilize either a remote pickup feature or a conferencing feature of some PBX's.

When utilizing the remote pickup feature, the voice messaging system 250 first receives call information through the phone emulator interface 251 without answering the call, using a means such as the "DISPLAY" feature of Northern Telecom's SL/1 or the "INSPECT" feature of certain AT&T systems. The voice messaging system may then instruct the appropriate voice port 240 to receive the call using a conventional remote pickup feature of many known PBX's.

When utilizing the conferencing method, the voice messaging system 250 first answers the call through the phone emulator interface 251 and receives call information. The appropriate voice port 240 may then be conferenced into the call utilizing conventional conferencing features of many known PBX systems and the feature phone interface 251 may then be disconnected from the call.

Another alternative to the preferred embodiment may be described with reference to Figure 6. Certain manufacturer's PBX's may be configured with a feature phone 630 with a data link 631 for supplying call information. In such a system, the data link 631 may be coupled with a voice messaging system 650 for supplying call information such as the call information supplied through the phone emulator interface 251 of Figure 2. The feature phone 630 may be coupled with a PBX 610 through a feature phone interface 612 using conventional means.

Voice ports 652 are coupled with the PBX 610 through a station interface unit 613. In this embodiment, the voice ports 652 need not share extension numbers with the feature phone 630. When the voice messaging system 650 receives call information over data link 631, it may instruct the PBX 610 to direct the call to one of the plurality of voice ports 652. This may be done through use of the remote pick-up facility of many known PBX systems as described above. Specifically, a remote pick-up code may be transmitted over the voice ports 652 to be received

at the PBX and the PBX directs the call to the voice port which transmitted the remote pick-up code in response to the transmittal of the remote pick-up code. Alternatively, various call transfer features are available in PBX's and these transfer features may be invoked by the voice messaging system through the feature phone port 631 to transfer the call to one of the voice ports 652.

INTERNAL CALLS

Figure 3(a) through 3(f) illustrate features of the preferred embodiment of the present invention when processing a call which originated internal to the local PBX (e.g., a phone set coupled with the local PBX calling another phone extension coupled with the same PBX).

If the voice messaging system receives a call which is forwarded from another extension, branch 301, the voice messaging system will respond with a message such as "Joe Jones is not available. Please leave a message at the tone or dial 0 for personal assistance", block 302.

In the preferred embodiment, a user may customize the introductory message with a personal greeting. For example, the user may replace "Joe Jones is not available" with "Hello, this is Joe Jones. I am on vacation until December 15th and will not be checking messages until that time".

The caller may then wait for a beep tone indicating a voice message may be recorded. The caller may leave a message after the beep tone, block 303.

One feature of the preferred embodiment allows the caller to depress the * (asterisk) key during the prompt message. If the caller enters an asterisk, the voice messaging system will skip the remainder of the prompt message and proceed directly to a beep tone after which the caller may leave a message. The preferred embodiment further allows a caller to depress keys during any prompt to enter commands to the voice messaging system and, thus, increase the speed of processing a call.

Alternatively, the caller may depress the 0 (zero) key. As illustrated by Figure 3(b), the voice messaging system transfers the call to a personal assistant number. In the preferred embodiment, each person having a phone extension in the PBX may have a mailbox associated with the extension. The mailbox can be configured with a number of options.

One inventive feature of the present invention allows the mailbox to be configured with a personal assistant extension. For example, the president of the company may use as his personal assistant extension the extension of his personal secretary. Since the voice messaging system has been provided with information indicating the origin of the call, e.g. the call was originally destined for the president's phone, the voice messaging system may obtain from the appropriate mailbox the personal assistant extension for the desired extension and handle the call as described below.

The voice messaging system initiates a transfer of the call to the personal assistance extension by momentarily interrupting the PBX's loop current on

the voice messaging system's voice port. This is often referred to as a hookswitch flash since it is processed by the PBX essentially the same as processing a manual transfer of a call initiated by a live person momentarily depressing the hookswitch of a telephone. The voice messaging system outpulses the personal assistance extension number to the PBX preceded by any required PBX transfer codes.

The voice messaging system monitors the line to ensure that a call is answered by the personal assistant. If the call is unanswered after a predetermined number of rings or if the personal assistance extension is busy, branch 321, the voice messaging system performs another hookswitch flash and outpulses any required reconnect codes to reconnect the caller and announces to the caller "Personal assistance is not available. Please leave a message for Joe Jones.", block 322. The voice messaging system provides a beep tone and allows the caller to leave a voice message in the mailbox of the person being called, block 323.

If the voice messaging system detects that personal assistance is available, i.e. the phone is answered, the voice messaging system announces the call to the personal assistance attendant, block 324. For example, the voice messaging system may announce to the attendant "Connecting forwarded call, Joe Jones is unavailable". As the voice messaging system has been supplied with information such as whether Joe Jones' line is busy, unanswered or placed in a mode in which it is not accepting calls, the voice messaging system is able to supply such information to the attendant. The attendant is then more intelligently and efficiently able to handle the call.

The voice messaging system connects the call after the announcement, block 325. One feature of the preferred embodiment allows the voice messaging system to monitor the personal assistance extension and provide the announcement to the personal attendant while preventing the caller from hearing ringing tone and from hearing the announcement. The caller is connected to the personal assistance extension by the voice messaging system hanging up after the announcement is made to the attendant.

The personal assistance feature may be configured to be available only during certain hours (e.g. normal business hours) and unavailable at other times (e.g. nights, weekends, holidays). Further, a mailbox user may turn the personal assistance feature on or off as configured option in his/her mailbox at any time. In addition, a personal assistance attendant may configure his/her mailbox to indicate the extension is not available to receive transferred calls.

Referring again to Figure 3(a), if the internal call is not a forwarded call, branch 307, the voice messaging system will assume the caller is attempting to log into his or her mailbox. The preferred embodiment of the present invention allows for several inventive features which make accessing a mailbox to change greetings, leave messages and make network calls more simplified than known prior art

systems.

The use of information supplied from the feature phone interface, as discussed above, allows the voice messaging system to process calls of users logging into their mailboxes more efficiently. For example, since the voice messaging system is supplied with the extension number being called from, it may not be necessary for the user to enter his mailbox (extension) number to access his mailbox. This same information allows the voice messaging system to let the user carry out certain common functions without the need to complete the process of logging into the mailbox. For example, changing personal greetings is a common function. In the preferred embodiment, as will be shown in more detail below, a user is able to change his/her personal greeting without completing the process of logging into the mailbox.

When the voice messaging system receives a call from a user attempting to log into his/her mailbox, it responds with a message such as "To enter your mailbox, press #. To change your personal greeting, press zero. To leave a quick message, press asterisk. To place a network call, please dial the network extension number.", block 308. If the user is familiar with this menu, he/she may depress the pound sign, zero, asterisk or network number at any time during the message.

If the user depresses the pound sign, branch 309, to indicate he/she wishes to enter his/her mailbox, the voice messaging system proceeds as illustrated by Figure 3(c). First, the voice messaging system determines whether the extension being called from has a mailbox. If it does, branch 331, the voice messaging system responds with a menu based on the mailbox configuration for the extension being called from and the configuration of the PBX/voice messaging system. In the preferred embodiment, the menu will always begin with a prompt such as "To enter your mailbox, press pound sign", block 332.

A class of service code associated with the mailbox determines whether the personal greeting may be changed without logging in. If it may be changed, a prompt such as "To change a greeting, press zero" is given as part of the menu. Referring briefly to Figure 3(d), if the user depresses zero branch 310, he/she is prompted to change the personal greeting associated with the mailbox, block 351. The user may then record a new greeting, listen to the current greeting, turn the greeting on or turn the greeting off, block 352. This and other features of the present invention may be enabled or disabled based on time-of-day, day-of-week, holiday, etc. In particular, by disabling this feature during non-business hours, unauthorized changes to the personal greeting may be prevented.

Certain configurations of the preferred embodiment allow for users of the voice messaging system to send messages to other user's mailboxes and have the messages tagged with the originator's mailbox address. This feature allows the receiver to reply to the message without looking up the originator's mailbox address or to immediately place a call to the originator of the message without

knowing the originator's extension. Further, by tagging the message with the originator's mailbox address, the originator may request notification of the receiver having listened to the message.

According to one feature of the present invention, a system configured with such an intra-messaging feature may have a prompt such as a "To leave a quick message, press asterisk". If the user depresses the asterisk key, branch 311, then, referring to Figure 3(e), he/she is prompted for a mailbox address to send a message to, block 361. The user is then allowed to record a voice message, block 362. The message is sent to the designated mailbox and tagged with the mailbox address of the sender, allowing use of the features of intra-messaging without logging into the user's mailbox.

The preferred embodiment may be configured to network a plurality of voice messaging systems and their associated PBX's together. For example, in a company with multiple plant sites located in geographically separate areas, each site may have its own PBX and voice messaging system. It is desired to allow a caller at one of these plant sites to call an extension at another plant site letting the voice messaging system select the optimal network route and place the call. The caller may be calling a person's extension at the other plant site or a mailbox extension. According to another feature of the present invention, when a plurality of voice messaging systems are networked together, the system may prompt with a message such as "To place a network call, please dial the network number" as part of the menu. The user may then enter a network extension number, branch 312.

Referring briefly to Figure 3(f), the voice messaging system selects an optimal network route for placing the network call, block 371. The voice messaging system then calls the networked PBX over the optimal route, block 372 and supplies the extension number to the networked voice messaging system in response to a prompt, block 373. The voice messaging system then connects the caller, block 374.

The voice messaging system utilizes a method similar to the method described previously in conjunction with transfers to personal assistance extensions to transfer the caller to the networked PBX. That is, the voice messaging system initiates transfer of the call by performing a hookswitch flash and outputting the networked PBX's phone number to the PBX. After the call is answered by the networked PBX and a prompt is provided by the networked voice messaging system requesting an extension, the voice messaging system provides the desired extension and hangs up to connect the caller with the desired network extension number.

Referring again to Figure 3(c), if the caller enters a pound sign in response to the menu prompts, branch 333, the voice messaging system will wait a predetermined amount of time. The user may enter a second pound sign during this period of time which indicates he wishes to log into the mailbox identified by the calling extension. Alternatively, if the user does not enter a second pound sign, branch 334, the voice messaging system will prompt with a message

such as "Enter your mailbox number", block 335. This feature allows, for example, a secretary to pickup a manager's messages from the secretary's phone or allows a mailbox user to pick up messages from an extension other than his/her own. The user will enter his/her mailbox number, block 336.

If the extension being called from does not have a mailbox associated with it, branch 337, the voice messaging system will prompt with a message such as "Enter your mailbox number", block 338, and the user may then enter his/her mailbox number, block 339.

In any event, the voice messaging system has been provided with the mailbox number which the user desires to log into. The voice messaging system then prompts with a message such as "Enter security code" if a security code has been specified for the mailbox, block 340. The user may enter the security code, block 341 and is logged into the mailbox.

Once logged into the mailbox, the user may perform a number of conventional functions such as listening to messages, sending messages, changing personal greetings, changing security codes, etc. Further, as an inventive feature of the present invention, when logged into a mailbox, a user may specify the personal assistant extension associated with the mailbox.

The above options, by allowing a user to quickly perform certain functions before or during logging into his/her mailbox, make the system responsive to the user's specific needs.

EXTERNAL CALLS

The voice messaging system is able to handle externally generated calls as well as internally generated calls.

The present invention is able to select a unique initial greeting based on an incoming trunk number or trunk group and able to provide flexible menus to support different classes of incoming calls which have not yet been transferred to specific extensions. For example, referring again to Figure 2, trunk group 205 may be a group of incoming WATS lines for accepting calls from customers for various types of customer support. The voice messaging system may be instructed to answer all calls coming in on trunk group 205 with a message such as "You have reached ABC company. Please dial 1 to place a sales order, please dial 2 for information regarding ABC's products, please dial 3 for information concerning scheduled ship dates for current orders or stay on the line for further assistance". The voice messaging system is able to provide this message because it has been informed through the feature phone interface 212 and phone emulator interface 251 that the call is an incoming call on trunk group 205. The user may then enter 1, 2, or 3 and receive the desired assistance or stay on the line to be forwarded to a predetermined extension for handling.

The selection of a particular message or menu for incoming calls may be made depending on either a trunk number or trunk group and also may be

customized depending on the time of day and day of week.

There are three methods utilized for handling unanswered external calls, the preferred method determined by the origination of the call and the extension being called. The voice messaging system is provided with information regarding the origin of the call and the extension being called through the feature phone interface. This information allows the voice messaging system to determine the particular method of handling the unanswered call.

The first option is used in the preferred embodiment for calls which are initially directed to the voice messaging system (i.e. calls which are not routed directly by the PBX to individual extensions). This option is more clearly illustrated by Figure 4(a). When a call is initially directed to the voice messaging system by the PBX, block 401, the caller is prompted by the voice messaging system to enter an extension number, block 402. The voice messaging system may further prompt the caller to enter zero to be connected with the operator and may prompt the caller that he/she will be automatically connected to the operator if the caller does nothing. If the caller enters an extension number, the voice messaging system "blind transfers" (the caller will hear PBX ring-back tone) the caller to the desired extension, block 403. If the call is not answered by the extension, branch 404, processing continues as illustrated in Figure 4(d).

The PBX forwarding scheme will forward the call to the voice messaging system on a ring-no-answer (the phone is not answered after a predetermined number of rings) or busy condition, block 431. The caller is then prompted with a message, for example "Joe Jones is not available. Please leave a private message at the tone, dial another extension or dial zero for personal assistance.", block 432. If personal assistance has not been specified for the desired extension, the prompt will state "dial zero for assistance" in place of "dial zero for personal assistance". In this case the call will be transferred to the PBX attendant in place of a personal assistant in response to the caller entering a zero.

If the person assigned to the desired extension has recorded a personal greeting, it will be played in place of "Joe Jones is not available".

When personal assistance is not available (i.e. the personal assistance extension is not answered or is busy), processing of the call is similar to the processing indicated in Figure 3(b), blocks 322 and 323, except the caller may be prompted with an additional option of pressing zero to be connected with the operator. This additional option is provided as a service to outside callers by the preferred embodiment. If the call is transferred to the operator, the call is transferred and announced by the voice messaging system as previously described.

Figure 4(b) illustrates a second option for processing of an external call used when the call is initially directed by the PBX to a desired extension such as may be the case with direct inward dial (D.I.D.) calls, block 411. If the call is answered by that desired extension, branch 413, no processing is required by the voice messaging system. If the call is

not answered by the desired extension or the extension is busy, branch 412, processing of the call is done as illustrated by Figure 4(d), discussed previously.

A third voice messaging option is provided by the preferred embodiment for processing calls requiring special handling. An example may be a call which is initially directed to the president of the company and the president desires that all calls, as a default option, will be answered by a live person rather than allowing a message to be recorded.

When a call is forwarded to the voice messaging system from an extension designated for this special handling, either because the extension is busy or not answered after a predetermined number of rings, block 420, the voice messaging system provides a message such as "Joe Jones is unavailable. Please wait for personal assistance or press asterisk to leave a message", block 421. If the caller does not press the asterisk key within a predetermined amount of time, branch 422, the voice messaging system attempts to transfer the call to the personal assistance number designated for the mailbox, block 423.

If the personal assistance number answers, branch 424, the voice messaging system announces and connects the call, block 425, in the same manner discussed previously.

If the personal assistance extension is not answered or is busy, branch 426, the voice messaging system provides a prompt such as "Personal assistance is unavailable. Please stay on the line for the operator or press asterisk to leave a message.", block 427. If the caller does not press the asterisk key, branch 428, the voice messaging system connects the caller with the operator. Otherwise, if the caller presses the asterisk key either in response to this prompt, branch 429, or in response to the previous prompt, branch 430, the voice messaging system responds with a message such as "Please leave a private message at the tone for Joe Jones. Recording" and then the voice messaging system provides a beep tone, block 440, after which the caller may leave a message, block 441. If Joe Jones has created a personal greeting, the personal greeting will be played in place of "Please leave a private message at the tone for Joe Jones."

Although the invention has been described herein with reference to a specific embodiment, many modifications and variations therein will readily occur to those skilled in the art. Accordingly, all such variations and modifications are included within the intended scope of the present invention as defined by the following claims.

Claims

1. A telephone system, comprising:

a telephone switching means comprising a first port for supplying call information to a feature phone, said first port associated with a plurality of extensions;
said telephone switching means further comprising a plurality of second ports, each of said

second ports associated with one of said plurality of extensions;

a voice messaging system coupled with said first port and said plurality of second ports for receiving said call information on said first port and further processing said call on one of said plurality of second ports.

2. The telephone system, as recited in Claim 1, wherein said voice messaging system comprises a phone emulation means for accepting call information from said first port and supplying said call information to said voice messaging system.

3. The telephone system, as recited in Claim 2, wherein said telephone switching means further comprises a third plurality of ports for coupling with a plurality of telephones, said telephone switching means further comprising a circuit for switching a call from one of said plurality of telephones to one of said plurality of extensions.

4. The telephone system, as recited by Claim 2, wherein said telephone switching means further comprises a fourth plurality of ports for coupling with a plurality of external telephone lines, said telephone switching means further comprising a circuit for switching a call from one of said plurality of external telephone lines to one of said plurality of extensions.

5. A telephone system, comprising:
a telephone switching means comprising a first port for supplying call information to a feature phone;

said telephone switching means further comprising a plurality of second ports;

each of said second ports associated with one of a plurality of extensions;

said feature phone comprising a third port for supplying said call information;

a voice messaging system coupled with said third port and said plurality of second ports for receiving said call information on said third port and further processing said call on one of said second ports.

6. The telephone system, as recited in Claim 5, wherein said voice messaging system comprises a fourth port for accepting call information from said third port and supplying said call information to said voice messaging system.

7. The telephone system, as recited by Claim 5, wherein call are initially directed to the voice messaging system through said third port and said voice messaging system supplies a code on one of said second ports and said switching means supplies said call on one of said second ports responsive to said code.

8. A method for processing a first telephone call in a telephone system, said telephone system comprising a switching means having a first port for supplying call information to a feature phone, said first port associated with a plurality of telephone extensions, said switching means further having a plurality of second ports, each of said second ports associated with one of said telephone extensions, and a

voice messaging system coupled with said first port and said plurality of second ports, comprising the steps of:

(a) said voice messaging receiving an indication of said first telephone call on said first port;

(b) said switching means providing call information to said voice messaging system over said first port;

(c) said voice messaging system completing processing of said first call on one of said plurality of second ports.

9. The method, as recited by Claim 8, wherein said voice messaging system answers said first call subsequent to receiving an indication of said first call on said first port and said voice messaging system places said first call on hold on said first port prior to said one of said plurality of second ports going off-hook.

10. The method, as recited by Claim 8, wherein said voice messaging system answers said first call subsequent to receiving an indication of said first call on said first port and said voice messaging system causes one of said plurality of second ports to be conferenced in on said first call.

11. The method, as recited by Claim 8, wherein said voice messaging system receives said call information responsive to providing a code to said switching means on said first port.

12. The method, as recited by Claim 8, wherein said first port receives a second call on said first port prior to completion of processing of said first call on said one of said plurality of second ports.

13. A method for processing a telephone call in a telephone system, said telephone system comprising a switching means having a first port for supplying call information to a feature phone, said switching means further comprising a plurality of second ports, each of said second ports associated with one of a plurality of extensions, said feature phone comprising a third port for supplying call information, said telephone system further comprising a voice messaging system coupled with said third port and said plurality of second ports, comprising the steps of:

(a) said voice messaging system receiving an indication of said telephone call on said third port;

(b) said switching means providing call information on said first port to said feature phone;

(c) said feature phone providing said call information on said third port to said voice messaging system;

(d) said voice messaging system providing a code on one of said second ports and said switching means providing said call on said one of said second ports responsive to said code.

14. A method for processing a telephone call in a telephone system, said telephone system comprising a plurality of telephone stations, a

switching means having a first plurality of ports for coupling with said plurality of telephone stations, and a voice messaging system, said voice messaging system coupled with said switching means, comprising the steps of:

(a) said switching means directing said call at a first of said plurality of telephone stations;

(b) determining said call is not answered by said first telephone station;

(c) said switching means directing said call to said voice messaging system in response to said call not being answered;

(d) said switching means providing said call information to said voice messaging system;

(e) said voice messaging system selecting a second of said plurality of telephone stations to transfer said call to, said second telephone station selected based on said call information.

15. The method, as recited by Claim 14, wherein said determination that said call was unanswered comprises determining whether said first telephone station is busy, whether said call is not answered by said first telephone station for a predetermined number of rings or determining said first telephone station has been placed in a mode in which it is not accepting calls.

16. The method, as recited by Claim 14, wherein said selection of a second of said plurality of telephone stations is based on the current time and day.

17. The method as recited by Claim 14, wherein said second of said plurality of telephone stations is selected based on the source of a call.

18. The method, as recited by Claim 14, wherein said set of predetermined conditions comprises selecting a second of said plurality of telephone stations based on said first telephone station.

19. The method as recited by Claim 14, wherein said set of predetermined conditions comprises selecting a second of said plurality of telephone stations based on the time a call is received.

20. The method as recited by Claim 14, wherein said telephone system further comprises a feature phone coupled with said voice messaging system and said switching means, said feature phone receiving said call information from said switching means and supplying said call information to said voice messaging system.

21. The method, as recited by Claim 14, further comprising the steps of:

(a) determining said call is unanswered by said second telephone station;

(b) directing said call to said voice messaging system in response to said call being unanswered by said second telephone station;

(c) said voice messaging system provid-

ing said call access to a message recording means.

22. The method, as recited by Claim 21, wherein said message recording means is associated with said first telephone station.

23. The method, as recited by Claim 21, wherein said message recording means provides an announcement to said call, said announcement associated with said first extension.

24. The method, as recited by Claim 14, further comprising the step of said voice messaging system providing information to a person answering said second extension if said call is answered by said second extension.

25. The method, as recited by Claim 24, wherein said information comprises identifying information identifying said first telephone station.

26. The method, as recited by Claim 24, wherein said information comprises the reason said call was unanswered by said first telephone station.

27. In a telephone system, said telephone system comprising a plurality of extensions and a messaging means, said messaging means comprising a plurality of mailboxes associated with said plurality of extensions, each of said mailboxes having an access code, a first method comprising:

(a) accessing said messaging means from one of said telephone stations;

(b) supplying said messaging means with a first identifying information, said first identifying information identifying a first mailbox;

(c) supplying said messaging means with an access code for said first mailbox;

(d) said messaging means allowing access to a first set of predetermined functions in response to said first identifying information and said access code;

and a second method, comprising:

(a) accessing said messaging means from one of said telephone extensions;

(b) supplying said messaging means with a second identifying information, said second identifying information identifying a second mailbox;

(c) said messaging means allowing access to a second set of predetermined functions in response to said second identifying information.

28. The method, as recited by Claim 27, wherein said second method is available depending on time and day.

29. A method, as recited by Claim 27, wherein said first and second identifying information is automatically supplied by said telephone system to said messaging means.

30. The method, as recited by Claim 27, wherein said second predetermined set of functions comprises changing a personal greeting.

31. A method, as recited by Claim 27, wherein said second predetermined set of functions

comprises sending a message.

32. The method, as recited by Claim 27, wherein said second predetermined set of functions comprises accessing a telephone system network.

33. A method for processing a telephone call in a telephone system, said telephone system comprising at least one call originating means, at least one call receiving means, switching means for switching calls from said call originating means to said call receiving means, said switching means having a first port for providing call origination and destination information to a feature phone, said first port associated with a plurality of extensions, a second plurality of ports associated with said plurality of extensions and a messaging means coupled with said first port and said plurality of second ports, comprising the steps of:

(a) originating a call from one of said call originating means to one of said call receiving means;

(b) determining said call was unanswered by said call receiving means;

(c) said switching means providing said call to said messaging means in response to said call being unanswered;

(d) said switching means providing said messaging means with said call origination and destination information;

(e) said messaging means providing a voice message to said call, said voice message associated with said call receiving means.

34. The method, as recited by Claim 33, wherein said message may be changed by accessing said messaging means.

35. A method for processing telephone calls in a telephone system, said telephone system comprising a first call originating means, a second call originating means, at least one call receiving means, switching means for switching calls from one of said first call originating means or said second said call originating means to one of said call receiving means and a messaging means, comprising the steps of:

(a) said switching means receiving a first call from said first call originating means;

(b) said switching means providing said first call to said messaging means, said switching means further providing a first identifying information, said first identifying information identifying said first call as originating from said first call originating means;

(c) said messaging means providing a first message to said first call in response to receiving said first call and said first identifying information;

said method further comprising the steps of:

(a) said switching means receiving a second call from said second call originating means;

(b) said switching means providing said second call to said messaging means, said switching further providing a second ident-

ifying information, said second identifying information identifying said second call as originating from said second call originating means;

(c) said messaging system providing a second message to said second call in response to receiving said second call and said second identifying information.

36. The method, as recited by Claim 35, wherein said first call originating means comprises a first plurality of external telephone trunks, said first plurality of external telephone trunks coupled with said switching means.

37. The method, as recited by Claim 36, wherein said second call originating means comprises a second plurality of external telephone trunks, said second plurality of external trunks coupled with said switching means.

38. The method, as recited by Claim 35, wherein said switching means comprises a private branch exchange.

39. The method, as recited by Claim 35, wherein said first message comprises a first menu of call options.

40. The method, as recited by Claim 35, wherein said second message comprises a second menu of call options.

41. The method, as recited by Claim 39, further comprising the step of switching said first call to one of said call receiving means in response to selection of one of said first call options.

42. The method, as recited by Claim 40, further comprising the step of switching said second call to one of said call receiving means in response to selection of one of said second call options.

43. A method for processing a telephone call in a telephone system, said telephone system comprising a plurality of telephone stations, a switching means having a first plurality of ports for coupling with said plurality of telephone stations and a voice messaging system, said voice messaging system coupled with said switching means comprising the steps of:

(a) said switching means directing said call at a first of said plurality of telephone stations;

(b) determining said call is not answered by said first telephone station;

(c) said switching means directing said call to said voice messaging system in response to said call not being answered;

(d) said switching means providing call information to said voice messaging system;

(e) said voice messaging system selecting a second of said plurality of telephone stations to transfer said call to based on a set of predetermined conditions, said second telephone station selected based on said call information;

(f) said voice messaging system indicating to said switching means said call is to be transferred to said second telephone station;

(g) said switching means connecting said voice messaging system with said second telephone station;

(h) said voice messaging system announcing said call to said second telephone station after said second telephone station answers;

(i) said voice messaging system disconnecting from said call after announcing said call;

(j) said switching means connecting said call with said second telephone station in response to said voice messaging system disconnecting from said call.

44. The method, as recited by Claim 43, wherein said voice messaging system indicates to said switching means said call is to be transferred by temporarily interrupting loop current on said switching means and outputting an identification number identifying said second telephone station.

45. The method, as recited by Claim 43, further comprising the steps of:

(a) determining said call is not answered by said second telephone station;

(b) said voice messaging system reconnecting to said call in response to said call not being answered;

(c) said switching means providing said call information to said voice messaging system;

(d) said voice messaging system indicating to said switching means said call is to be transferred to a third telephone station in response to said call not being answered by said second telephone station;

(e) said voice messaging system announcing said call to said third telephone station after said third telephone station answers;

(f) said voice messaging system disconnecting from said call;

(g) said switching means connecting said call with said third telephone station in response to said voice messaging system disconnecting from said call.

46. The method as recited by Claim 43, wherein said switching means further comprises a second port for supplying said call information to said voice messaging system.

47. The method as recited by Claim 43, wherein said telephone system further comprises a feature phone coupled with said voice messaging system and said switching means, said feature phone receiving said call information from said switching means and supplying said call information to said voice messaging system.

48. The method, as recited by Claim 43, wherein said selection of said second of said plurality of telephone station is based on the time and day.

49. A method of processing a telephone call in a telephone system, said telephone system comprising at least one telephone station, a

switching means for switching said telephone call, and a messaging means for providing messages to said telephone call, comprising the steps of:

(a) said switching means receiving said telephone call and directing said telephone call at said telephone station;

(b) said telephone call being unanswered by said telephone station;

(c) said messaging means providing a messaging to said telephone call, said message describing the reason said call was unanswered.

50. A method for processing a telephone call in a telephone system, said telephone system comprising a switching means for switching said telephone call, a first telephone extension, a second telephone extension, a third telephone extension, said first, second and third telephone extensions coupled with said switching means and a voice messaging system, comprising the steps of:

(a) said switching means directing said telephone call at said first telephone extension;

(b) detecting said telephone call is not answered by said first telephone extension;

(c) said voice messaging system providing the caller placing said telephone call a plurality of menu options, said plurality of menu options depending on the time and day of said telephone call.

51. The method as recited by Claim 50, wherein said caller indicates said call is to be transferred to a second extension responsive to said menu options.

52. The method as recited by Claim 51, wherein said caller indicates said call is to be transferred by depressing a predetermined digit on said caller's telephone set.

53. A method for processing a telephone call in a telephone system, said telephone system comprising a switching means for switching said telephone call, a first telephone extension, a second telephone extension, a third telephone extension, said first, second and third telephone extensions coupled with said switching means and a voice messaging system, comprising the steps of:

(a) said switching means directing said telephone call at said first telephone extension;

(b) detecting said telephone call is not answered by said first telephone extension;

(c) said voice messaging system providing a message to said telephone call, said message comprising information regarding the reason said first telephone station did not answer said telephone call;

(d) caller placing said telephone call indicating to said voice messaging system said telephone call is to be transferred to said second telephone extension, said

second telephone extension associated with said first telephone extension.

54. A method for processing a telephone call in a telephone system, said telephone system comprising a switching means for switching said telephone call, a first telephone extension, a second telephone extension, a third telephone extension, said first, second and third telephone extensions coupled with said switching means and a voice messaging system, comprising the steps of:

(a) said switching means directing said telephone call at said first telephone extension;

(b) detecting said telephone call is not answered by said first telephone extension;

(c) caller placing said telephone call indicating to said voice messaging system said telephone call is to be transferred to said second telephone extension, said second telephone extension associated with said first telephone extension;

(d) said voice messaging system providing an informational message to said second telephone extension.

55. The method as recited by Claim 54, wherein said informational message comprises information identifying said first telephone extension.

56. The method as recited by Claim 54, wherein said informational message comprises information regarding the reason said first telephone extension did not answer said telephone call.

57. A method for processing a telephone call in a telephone system, said telephone system comprising a switching means for switching said telephone call, a first telephone extension, a second telephone extension, a third telephone extension, said first, second and third telephone extensions coupled with said switching means and a voice messaging system, comprising the steps of:

(a) said switching means directing said telephone call at said first telephone extension;

(b) detecting said telephone call is not answered by said first telephone extension;

(c) caller placing said telephone call indicating to said voice messaging system said telephone call is to be transferred to said second telephone extension, said second telephone extension associated with said first telephone extension;

(d) detecting said telephone call is not answered by said second telephone extension;

(e) reconnecting said telephone call to said voice messaging system responsive to said telephone call being unanswered by said second telephone extension;

(f) said voice message allowing said caller to leave a voice message for said first

telephone extension.

58. The method as recited by Claim 57, wherein said caller may indicate to said voice messaging system said telephone call is to be transferred to said third extension if said telephone call is unanswered by said second telephone extension.

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FIG. 1 (PRIOR ART)

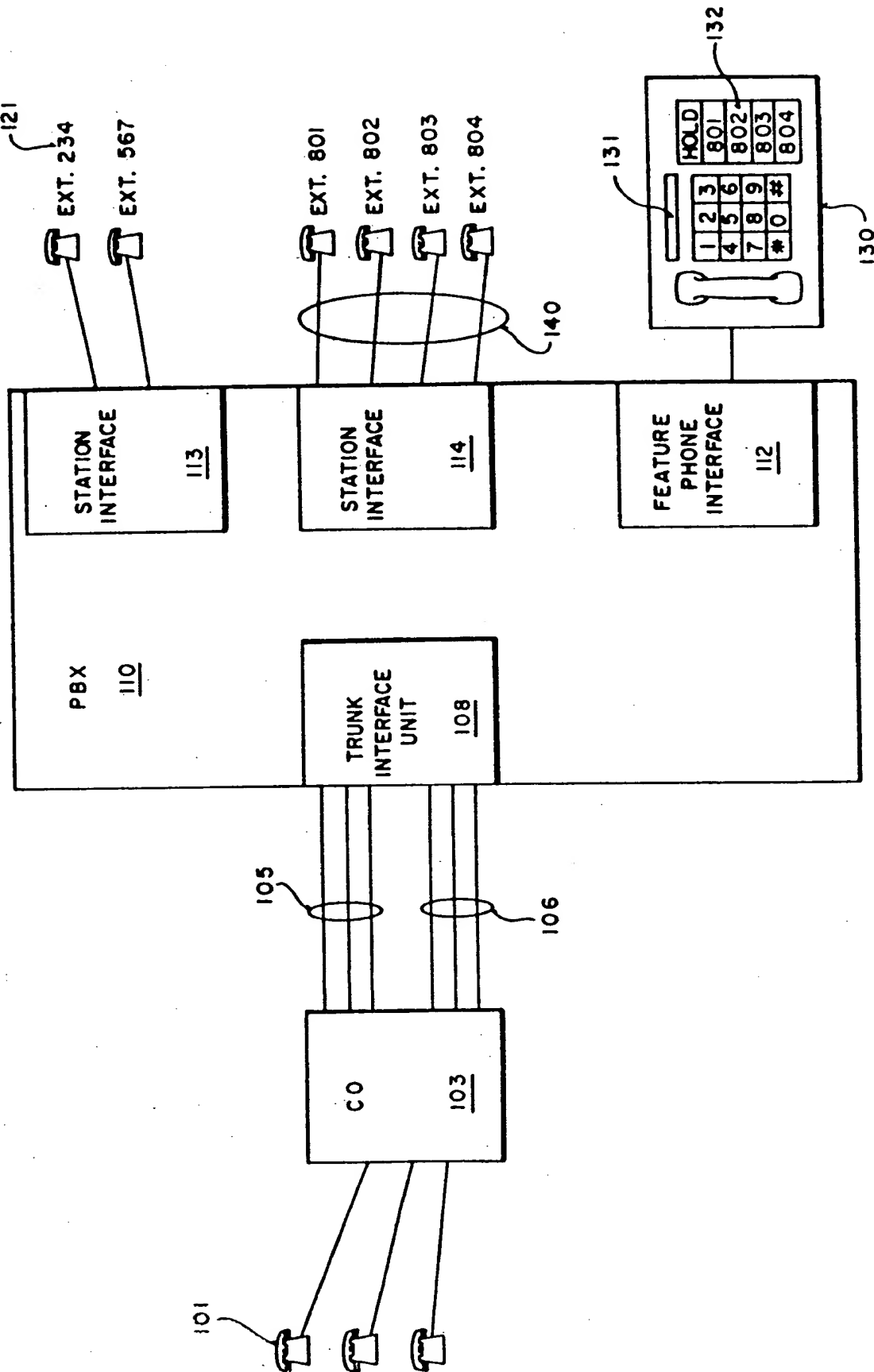


FIG. 2

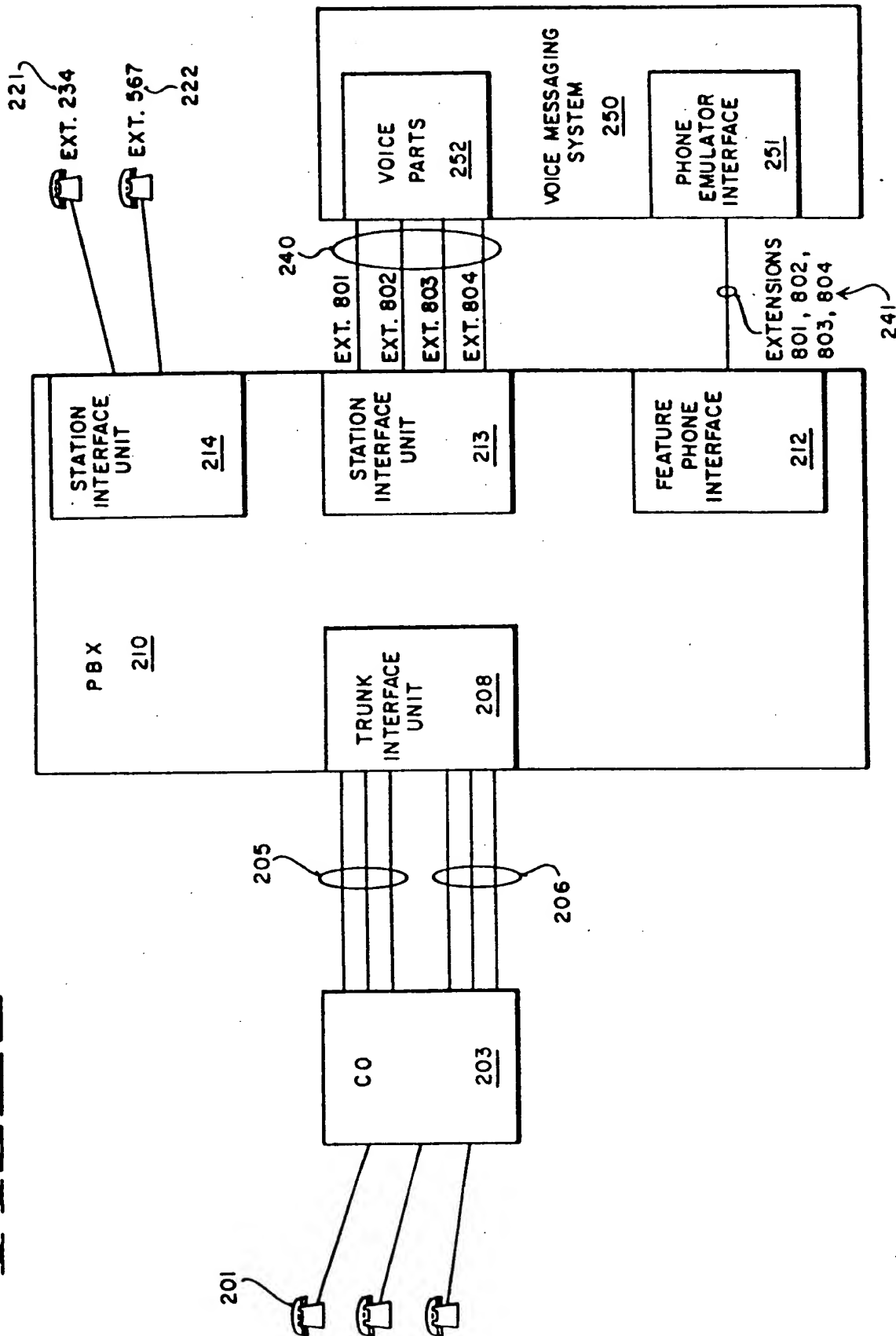


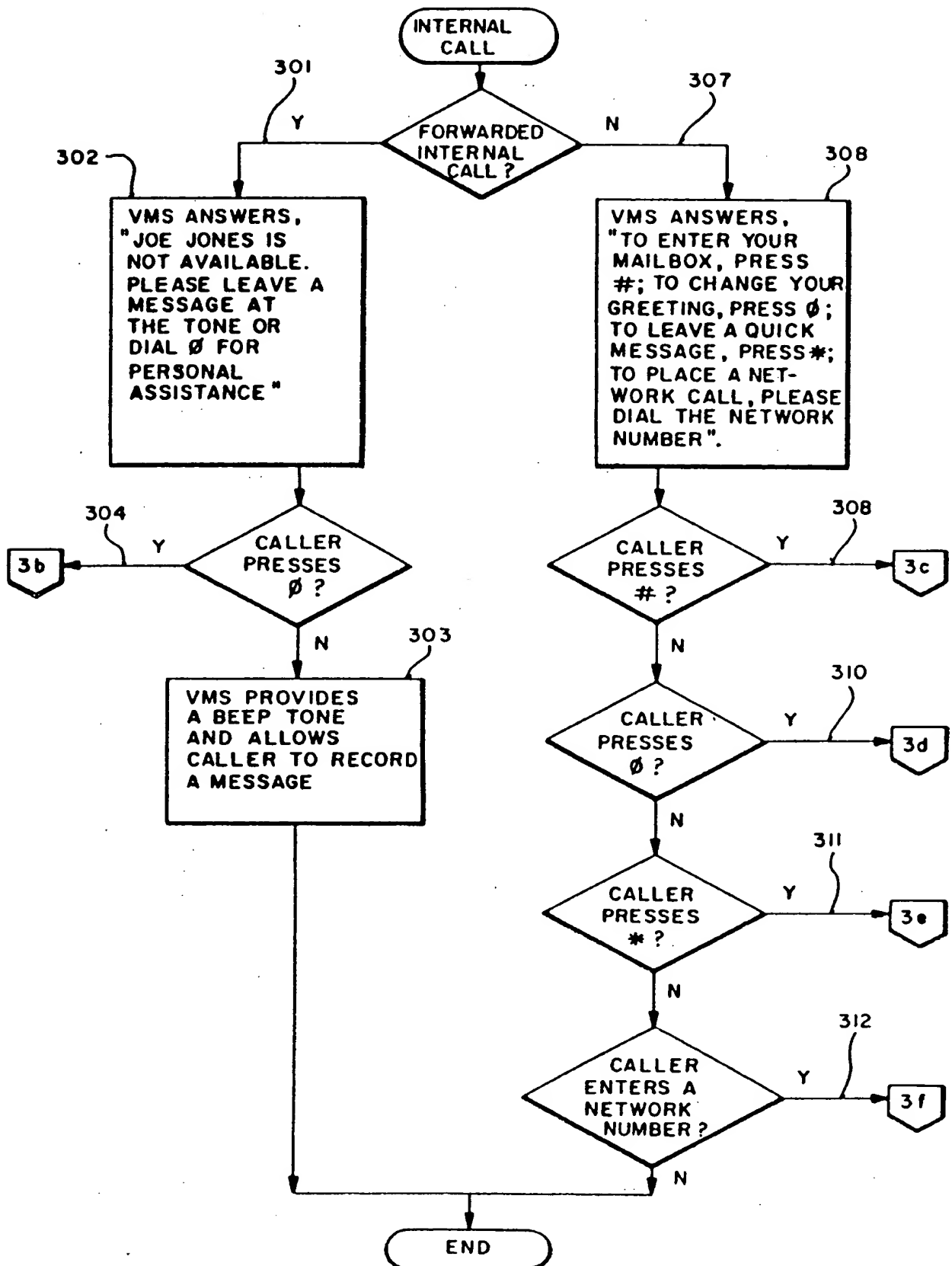
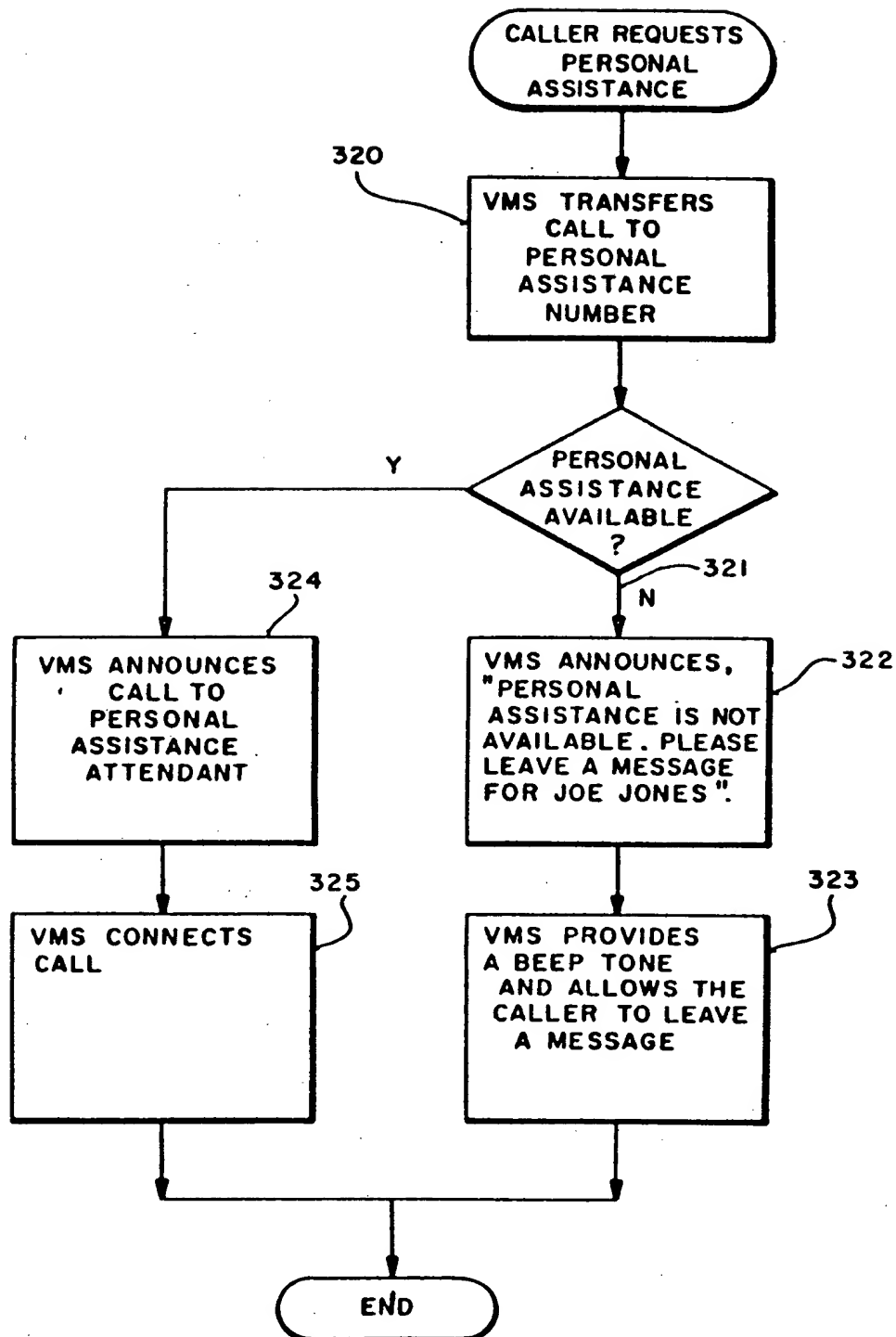
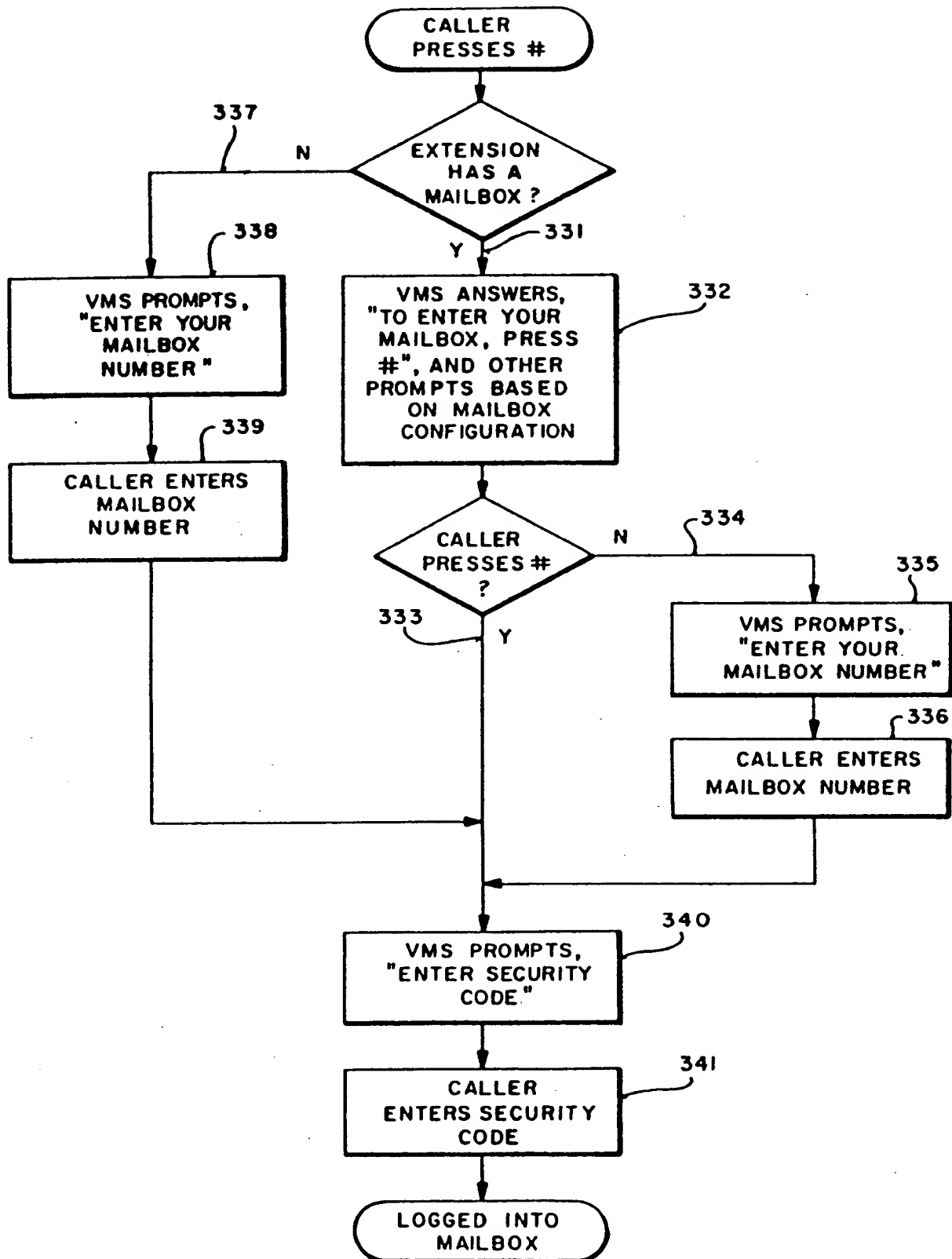
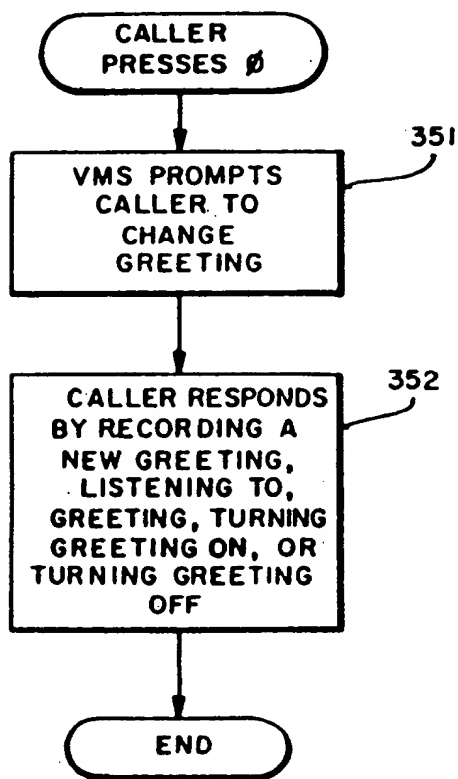
FIG 3A

FIG 3B

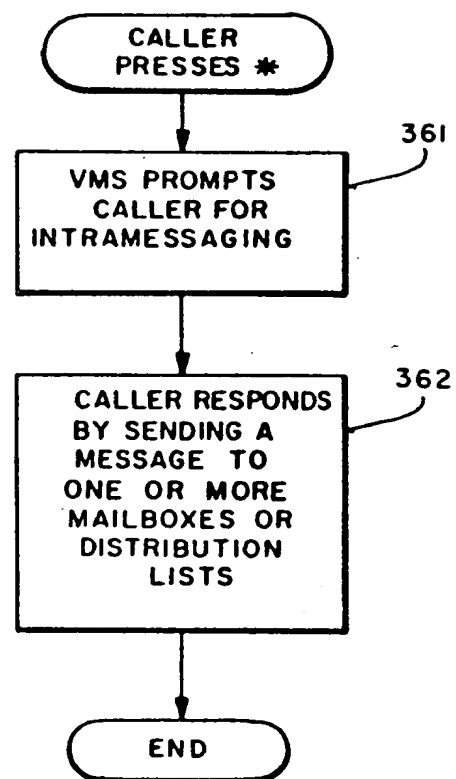
**FIG 3C**

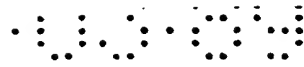
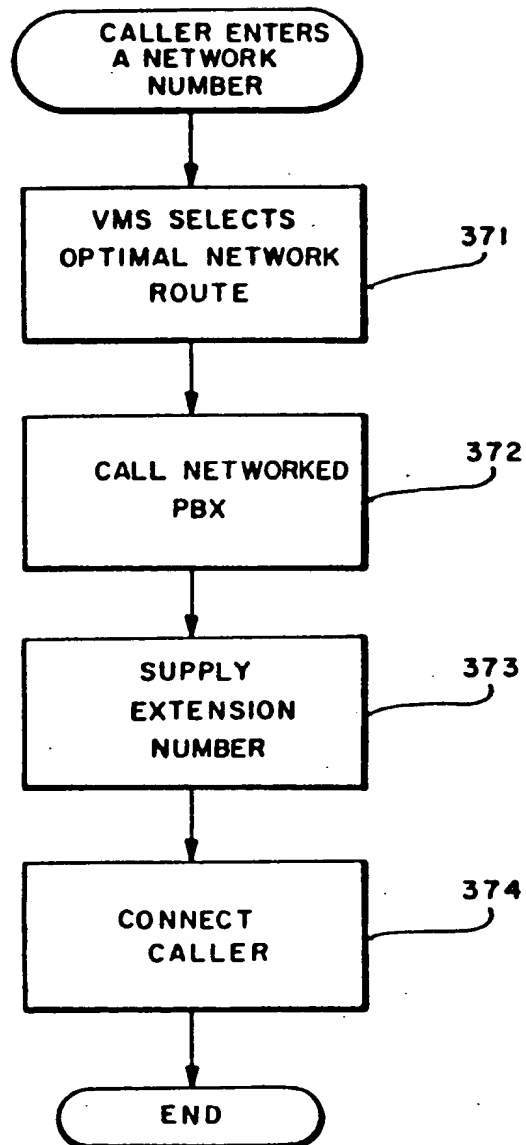


**FIG
3D**



**FIG
3E**



**FIG 3F**

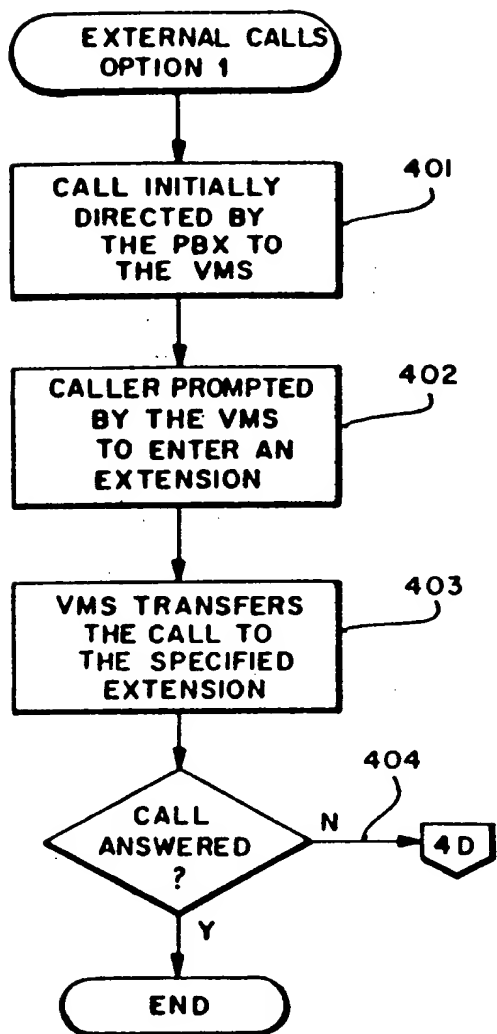
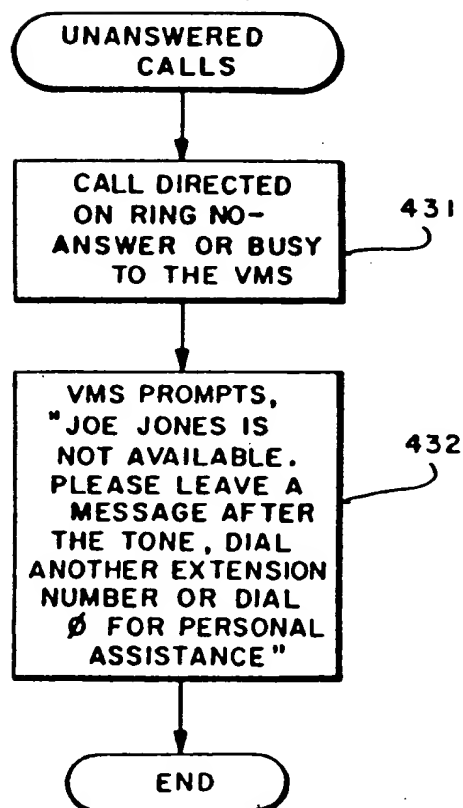
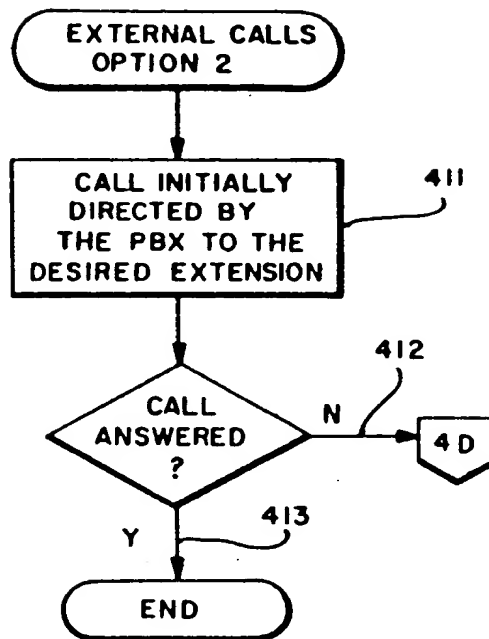
**FIG
4A****FIG
4B****FIG
4D**

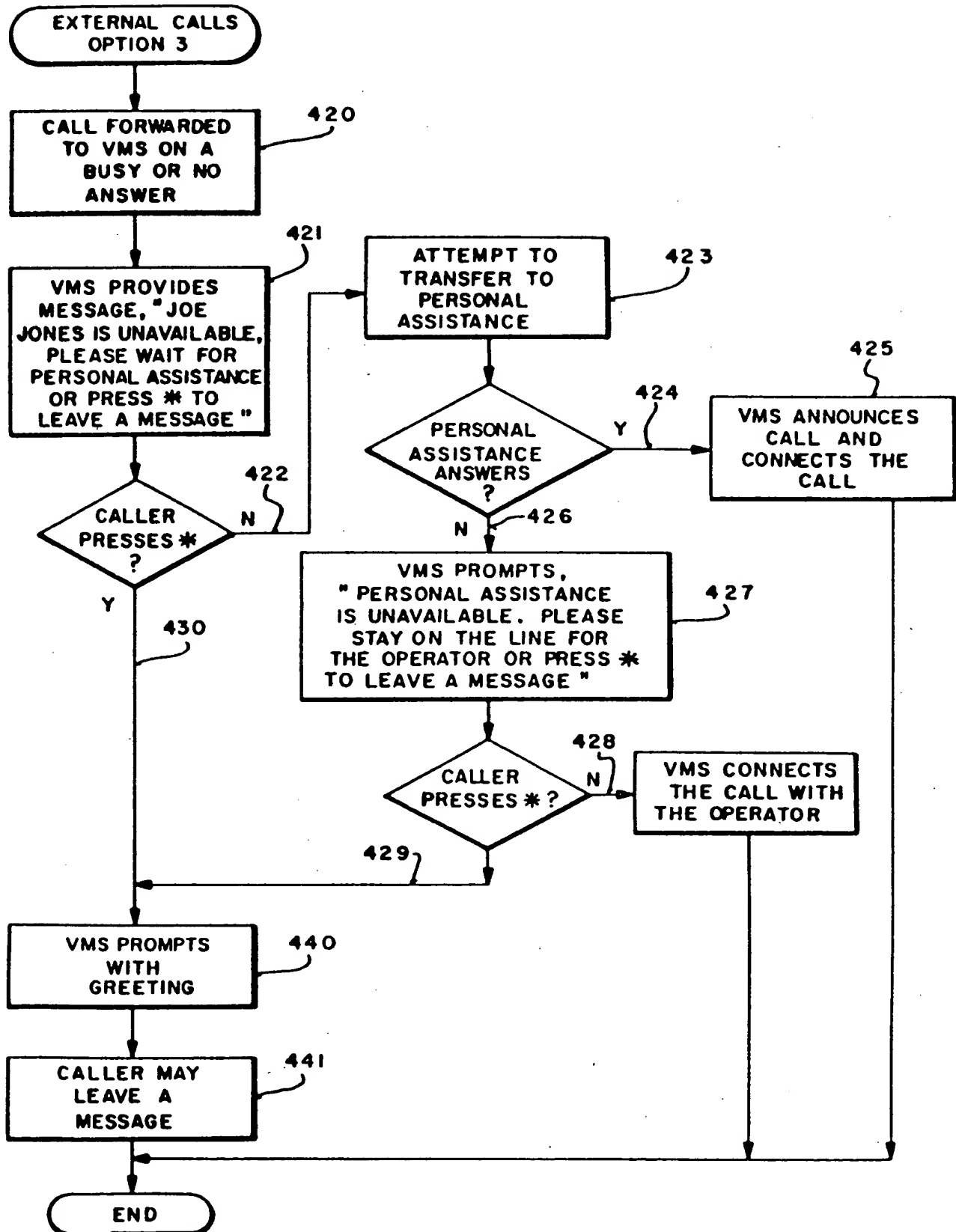
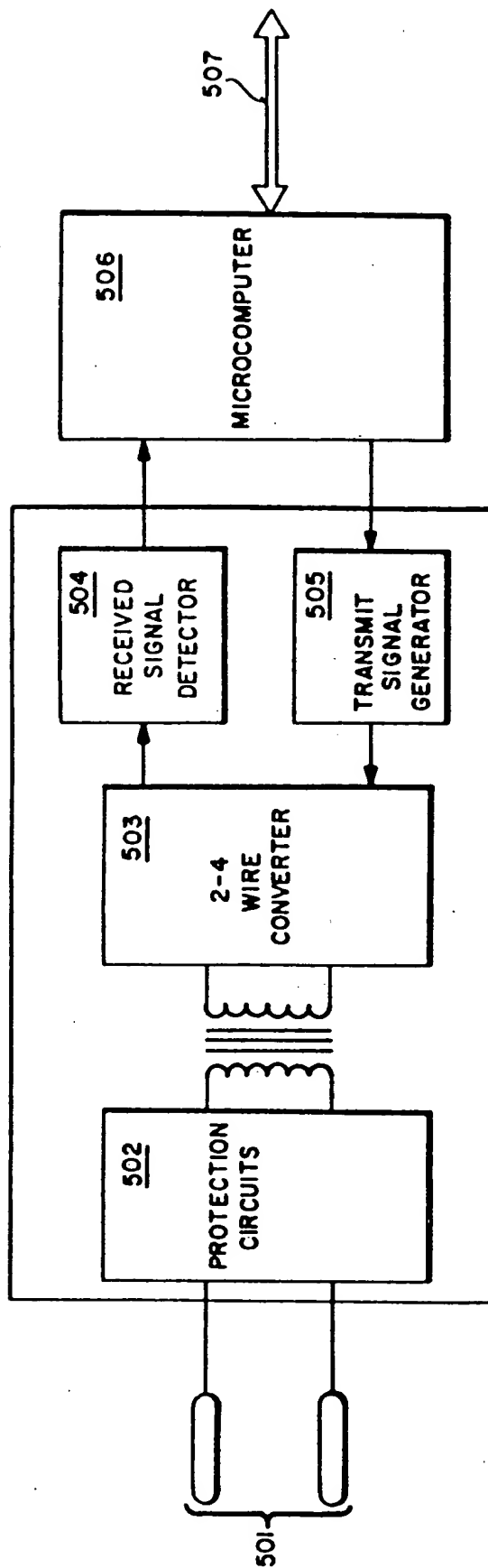
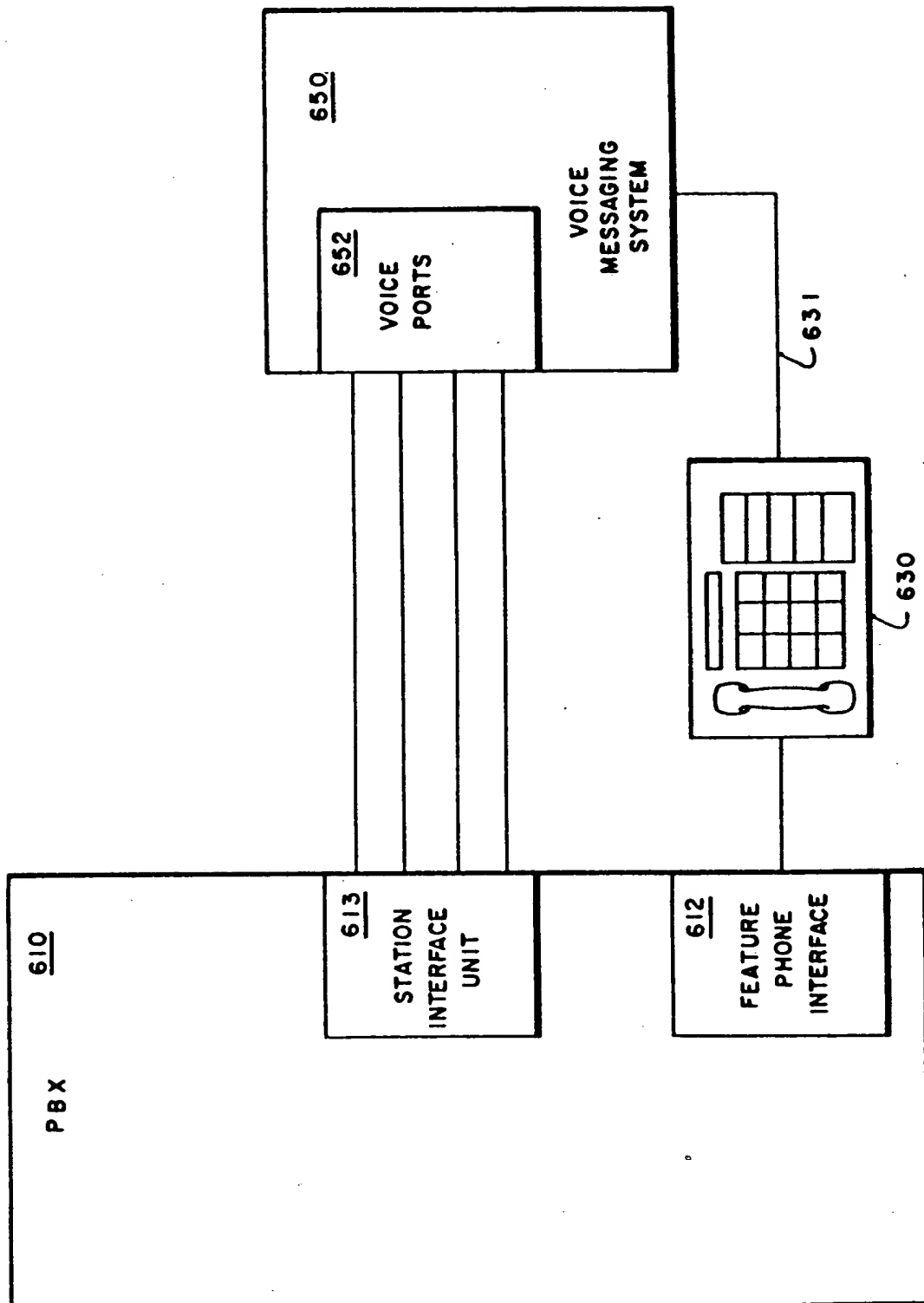
FIG 4C

FIG. 5

FIG. 5





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H04M3/54-H04Q3/62F-[T04M1:57]-
[T04M3:50A]-[T04M3:50E]-
[T04M3:50F1]-[T04M7:00P]-
+++++
[T04M300:38]-[T04Q3:70]-



(11) Publication number: **0 330 441 A3**

-5- * -

H04M3/42P **TENT APPLICATION**

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(54) **Interface to and operation of a voice messaging system.**

(57) A voice messaging system (250) for use with a telephone system. The preferred embodiment comprises a voice messaging system (250) which interfaces to a PBX (210) through a feature phone interface (212), the voice messaging system emulating a feature phone. The PBX supplies information to the voice messaging system such as information on the origination and history of the call. The present invention discloses improved methods of handling calls directed to the voice messaging system based on the information supplied by the PBX.

EP 0 330 441 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 1699

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|--|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| P,X | EP-A-0 299 784 (OCTEL) * Column 1, line 3 - column 3, line 23 * | 1-2 | H 04 Q 3/62 H 04 M 3/50 H 04 M 3/42 |
| A | --- IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS, Toronto, 22nd-25th June 1986, vol. 1/3, pages 1.4.1-1.4.5 (18-22); J.A. SWART: "ISDN business services" * Pages 21,22; paragraph 4.6; figure 5 * | 1-13 | |
| A | --- EP-A-0 215 309 (WANG) * Column 7, lines 1-48 * | 1 | |
| A | --- WO-A-8 303 510 (WESTERN) * Page 3, lines 10-23; page 4, lines 5-16 * | 1 | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.4) |
| | | | H 04 Q H 04 M |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 15-11-1990 | Examiner VANDEVENNE M.J. |
| CATEGORY OF CITED DOCUMENTS | | | |
| X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document | |



European Patent
Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

X

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

See sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims,

namely claims: 1-13, 33-34



LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-13,33-34: Voice messaging system with feature phone emulation means.
2. Claims 14-26,43-48,54-58: Transfer of a call by a voice message system.
3. Claims 27-32: Accessing of mailboxes.
4. Claims 35-42,49-53: Selecting a unique announcement based on incoming trunk number, reasons the call was unanswered etc.